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KEY ISSUES:



- [During the summer, public health and quality of life, especially in cities, will be negatively affected by increasing heat waves, reduced air quality, and increasing insect and waterborne diseases. In the winter, warming will have mixed impacts.](#)
- [The likely increase in precipitation in winter and spring, more heavy downpours, and greater evaporation in summer would lead to more periods of both floods and water deficits.](#)
- [While the longer growing season provides the potential for increased crop yields, increases in heat waves, floods, droughts, insects, and weeds will present increasing challenges to managing crops, livestock, and forests.](#)
- [Native species are very likely to face increasing threats from rapidly changing climate conditions, pests, diseases, and invasive species moving in from warmer regions.](#)

Average temperatures in the Midwest have risen in recent decades, with the largest increases in winter. The length of the frost-free or growing season has been extended by one week, mainly due to earlier dates for the last spring frost. Heavy downpours are now twice as frequent as they were a century ago. Both summer and winter precipitation have been above average for the last three decades, the wettest period in a century. The Midwest has experienced two record-breaking floods in the past 15 years. There has also been a decrease in lake ice, including on the Great Lakes. Since the 1980s, large heat waves have become more frequent than anytime in the last century, other than the Dust Bowl years of the 1930s. The observed patterns of temperature increases and precipitation changes are projected to continue, with larger changes expected under higher emissions scenarios.

A note on the emissions scenarios

None of the emissions scenarios used in this report assume any policies specifically designed to address climate change. All, including the lower emissions scenario, assume increases in

heat-trapping gas emissions for at least the next few decades, though at different rates.

Key Issues

Climate on the Move

Changing Summers in the Midwest

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During the summer, public health and quality of life, especially in cities, will be negatively affected by increasing heat waves, reduced air quality, and increasing insect and waterborne diseases. In the winter, warming will have mixed impacts.

Heat waves that are more frequent, more severe, and longer-lasting are projected. The frequency of hot days and the length of the heat-wave season will both be more than twice as great under a higher emissions scenario than a lower one (see full report for information on emission scenarios). Insects such as ticks and mosquitoes that carry disease will survive winters more easily and produce larger populations in a warmer Midwest.

Projected Changes in Great Lakes Levels under Higher Emissions Scenario†

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Significant reductions in Great Lakes water levels, which are projected under higher emissions scenarios, lead to impacts on shipping, infrastructure, beaches, and ecosystems.

Higher temperatures will mean more evaporation and hence a likely reduction in Great Lakes water levels. Reduced lake ice increases evaporation in winter, contributing to the decline. This will affect shipping, ecosystems, recreation, infrastructure, and dredging requirements. Costs will include lost recreation and tourism dollars and increased repair and maintenance costs.

The likely increase in precipitation in winter and spring, more heavy downpours, and greater evaporation in summer would lead to more periods of both floods and water deficits.

The projected pattern of increasing precipitation in winter and spring and heavy downpours is expected to lead to more frequent flooding, increasing infrastructure damage, and impacts on human health. Heavy downpours can overload drainage systems and water treatment facilities, increasing the risk of waterborne diseases. In summer, with increasing evaporation and longer periods between rainfalls, the likelihood of drought will increase and water levels in rivers and wetlands are likely to decline.

While the longer growing season provides the potential for increased crop yields, increases in heat waves, floods, droughts, insects, and weeds will present increasing challenges to managing crops, livestock, and forests.

Spring flooding is likely to delay planting. An increase in disease-causing pathogens, insect pests, and weeds cause additional challenges for agriculture. Livestock production is expected to become more costly as higher temperatures stress livestock, decreasing productivity and increasing costs associated with the needed ventilation and cooling equipment.

Native species are very likely to face increasing threats from rapidly changing climate conditions, pests, diseases, and invasive species moving in from warmer regions.

All major groups of animals including birds, mammals, amphibians, reptiles, and insects will be affected by climate change impacts on local populations and by competition from species moving into the Midwest. The potential for animals to shift their ranges to keep pace with the changing climate will be inhibited by major urban areas and the presence of the Great Lakes.